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Real-World Outcomes for ECMO in COVID-19

INVITED COMMENTARY:

Extracorporeal membrane oxygenation (ECMO) is an important form of life support for the sickest patients with COVID-19-related acute respiratory distress syndrome. Initial observational studies demonstrated similar mortality rates in patients supported with ECMO for COVID-19 and non-COVID-19-related acute respiratory distress syndrome (approximately 30%-40%).[1,2] Studies after the first wave suggested that mortality increased from initial estimates, with overall mortality exceeding 50%.[3,4] It is important to note that these and similar studies are limited by lack of control groups and confounded by severity of illness, timing of support, ECMO delivery models, and center expertise; they are also highly selected populations. In the only unselected cohort of COVID-19 patients receiving ECMO from a countrywide German database, the mortality was 68%.[4]

Against this background, Hall and colleagues[5] report their clinical experience of 505 patients with COVID-19 at 61 US hospitals in this issue of *The Annals of Thoracic Surgery*. The mortality rate of 61% was higher than reported in numerous similar cohorts. Nevertheless, it is in keeping with the German experience.[4,5]

Odds of survival declined with a longer time between diagnosis of COVID-19 and endotracheal intubation, potentially bolstering the assertion that postponing invasive ventilation in patients with impending respiratory failure could worsen outcomes. Although this finding has face validity, it is confounded by uncertainty between the true onset of COVID-19 and the time of laboratory diagnosis, as well as access to testing early in the pandemic.

Comparison of existing COVID-19 studies raises the question of why such differences in outcomes exist and what the "right" mortality for COVID ECMO should be? The answer is unknowable from the current data. Even if criteria for ECMO could be standardized, data on outcomes would still be confounded by varying ECMO delivery models. Randomized clinical trials are needed to better understand the efficacy of ECMO in this population. What the present, and the German, studies show us are "real world" observational data. Hall and colleagues included both community and academic centers that reported case volumes varying from over 70 cases in the study period to fewer than 5 (with a known volume-outcome relationship with ECMO).[3]

Several recommendations can be made. First, where feasible, ECMO should be provided by experienced centers. This was not always possible during the pandemic. Second, centers with high mortality relative to registry data should consider being more restrictive with ECMO criteria. Similarly, low mortality rates may represent an opportunity to expand ECMO criteria. Third, although there is no consensus on the ideal ECMO delivery model, centers reporting good outcomes may

be used as benchmarks within the context of local practice constraints. Delivery models may be assessed in terms of risk-adjusted outcomes, staffing intensity, standardization, and cost, with the understanding that these exist in a matrix; optimizing one metric may be deleterious to another. Ultimately, absent well-conducted randomized trials, quality in ECMO will likely follow patterns found in delivery of other technologies and will improve by bringing collective local attention to the clinical challenge.

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